<u>REMARKS</u>

In the Office Action dated December 27, 2006, claims 1-5, 13-16, and 22-24 were rejected under 35 U.S.C. § 102 over U.S. Patent Application Publication No. 2003/0093407 (Cochrane); claims 6-12, 17-21, and 25-28 were rejected under 35 U.S.C. § 103 over Cochrane in view of U.S. Patent No. 7,035,843 (Bellamkonda).

The rejection of independent claim 1 over Cochrane has been maintained in the present Office Action. Applicant's previous arguments focused on the fact that Cochrane does not disclose a controller that is responsive to a change to at least one base table by updating a first result set by computing a change to the first result set based on a change in the at least one base table, and *updating the second result set by computing a change to the second result set based on the change to the first result set*. As defined in claim 1, the first result set and second result set are contained in a view that contains results of a cube-based operation on at least one base table. The first result set is for a group-by on a first grouping set, and the second result set is for a group-by on a second grouping set.

The Response to Arguments section of the Office Action cited ¶ [0035] for the proposition that there are two classes of materialized views. As indicated by ¶ [0035], one class of materialized views includes "self-maintainable materialized views" that are maintained incrementally by processing only the set of updated rows without reference to the underlying tables of the materialized view query. The other class of materialized views noted in ¶ [0035] of Cochrane includes materialized views that are maintained incrementally by processing the updated rows and visiting the underlying tables to recompute some portions of the materialized view query.

Based on the teachings of ¶ [0035], the Office Action stated that "the underlying tables have an impact (with respect to updates) to materialized views." 12/27/2006 Office Action at 23. Applicant does not dispute that underlying tables "have an impact" on materialized views. In fact, the specific teaching of Cochrane is that modifications (in the form of insert/delete/update) on the base tables cause incremental maintenance of summary tables (views) by computing a "raw delta." Cochrane, ¶ [0093]. The key issue argued by Applicant in the previous Reply to Office Action is that Cochrane does *not* teach the updating of the second result set (for a group-by on a second grouping set) by computing a change to the second result set based on the change to the first result set (for a group-by on a first grouping set), where both the first result set

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and second result set are contained in the same view that contains results of a cube-based operation on at least one base table.

Cochrane specifically teaches in ¶ [0108] that a delta stream (based on the modification of the base tables) is aggregated according to the grouping specification of the view to produce a "complete delta cube," which is then paired with the "current content" of the view (summary table) using a left outer-join over the grouping and grouping function columns. Cochrane, ¶ [0114].

The incremental update of a materialized view is explained more fully on pages 6 and 7 of Cochrane. On page 6, ¶ [0093] refers to a propagation phase in which a raw delta (representing a change) as a result of an insert/delete/update operation on the base tables is computed. Paragraph [0094] of Cochrane then states that the raw delta stream is aggregated according to the grouping definition of the summary table (view). Significantly, the aggregated delta stream includes *multiple, distinct* grouping combinations. Cochrane, ¶ [0098]. This means that *all* grouping result sets of the view are processed based on the raw delta stream, which represents changes to the underlying base tables. *This teaches against updating one grouping result set of the view based on a change of another grouping result set of the view.*

As further noted by Cochrane, the delta stream is aggregated according to the grouping specification of the summary table (view). Cochrane, ¶ [0108].

> It is of *paramount importance* for that patent application that this step results in a data stream *holding multiple grouping combinations* in the presence of a complex grouping expression of the summary table. For example, if the summary table is defined using 'CUBE()', then this aggregation step yields in a complete *delta cube* with 'higher' aggregate values for the original delta changes.

Id. (emphasis added).

Thus, the delta aggregation of Cochrane produces a "delta cube" according to the complex group-by expression of the view definition. Cochrane, ¶ [0110]. After aggregation, this delta cube "is paired with the current content of the summary table [view] using a left outer-join over the grouping and grouping function columns ...." Cochrane, ¶ [0114].

The Office Action erroneously stated that "in summary, Cochrane teaches that underlying tables can be visited for recomputation which is the same as computing a change to a second result set based on the change to the first result set." 12/27/2006 Office Action at 23. Computing a change to a result set based on visiting underlying tables as taught by Cochrane

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corresponds to the first update task of claim 1: "update the first result set by computing a change to the first result set based on a change in the at least one base table." The teaching in Cochrane that underlying tables are visited to compute changes to the view does *not* constitute the second update task of claim 1: "update the result set by computing a change to the second result set *based on the change to the first result set.*" Note that the second update task differs from the first update task in that the second update task updates the second result set based on the change to the first result set, whereas the first update task updates the first result set based on a change to a base table. Cochrane's teachings regarding computing a change to the view based on the underlying table corresponds only to the first update task of claim 1.

The "computing deltas of steps I and II of paragraphs [0093] and [0104]" referred to on page 23 of the Office Action refer to the delta aggregation noted by Cochrane to produce a "delta cube" according to the complex group-by expression of the view definition. Cochrane, ¶ [0110]. The delta cube has a one-to-one correspondence between the content of the delta cube and the rows in the view to be updated (so that a left outer-join can be performed). Cochrane, ¶ [0114]. In other words, the result sets of the delta cube specifically reflect the changes that are to be made to the view. These result sets in the delta cube are all directly computed from the raw delta stream, which represents changes of the underlying base tables. There is no teaching of one result set being computed based on changes to another result set of the delta cube.

In view of the foregoing, it is clear that claim 1 is clearly not anticipated by Cochrane.

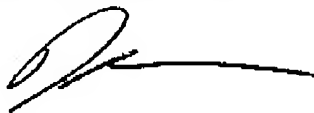Independent claims 13 and 22 are allowable for similar reasons.

In view of the allowability of base claims over Cochrane, it is respectfully submitted that the obviousness rejection of the dependent claims over Cochrane and Bellamkonda has also been overcome.

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      Allowance of all claims is therefore respectfully requested. The Commissioner is authorized to charge any additional fees and/or credit any overpayment to Deposit Account No. 14-0225 (11166).

Respectfully submitted,

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